UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/496,607	02/02/00	NETER S	YMEDIA.001A

020995 WM01/1101
KNOBBE MARTENS OLSON & BEAR LLP
620 NEWPORT CENTER DRIVE
SIXTEENTH FLOOR
NEWPORT BEACH CA 92660

EXAMINER	
CHRISTENSEN, A	
ART UNIT	**PAPER NUMBER**
2612	

DATE MAILED:
11/01/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/496,607	Neter
Examiner	**Art Unit**
Andy Christensen	2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on Aug 22, 2001

2a) ☒ This action is **FINAL.** 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-42 is/are pending in the applica

4a) Of the above, claim(s) _____ is/are withdrawn from considera

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-42 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirem

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 5

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

1. The Applicant's amendment filed August 22, 2001 has overcome the 35 USC 112 rejection of Claims 1-28.

2. The Applicant's arguments filed August 22, 2001 have been fully considered by the Examiner but they are deemed to be moot in view of the new ground of rejection in response to the Applicant's amendment.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3, 7, 8, 14-16, 18, 21-23, 28, 29, 31-36 and 38-41 are rejected under 35 USC 102(b) as being anticipated by Murayama et al. (U.S. Patent No. 4,930,006).

Regarding Claim 1, Murayama et al. disclose a color imaging system providing on-the-fly color interpolation using analog signals to reconstruct colors during sensor readout, comprising an array of pixel sensor elements wherein at least part of the array is arranged in rows and columns (Figure 1); a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array (Figure 2); a readout control circuit (Column 2, Lines 47-57); an array controller (Column 2, Lines 47-57) coupled to the array, wherein the readout circuit and the array controller are configured to simultaneously

read out values for a group of pixel elements within a first portion of the array, including at least two pixel elements from two different rows and two pixel elements from two different columns and to reconstruct color components for at least a first pixel sensor element and a second pixel sensor element using color information from other pixels elements within at least the first portion of the array while the readout control circuit is reading the first portion of the array (Column 3, Lines 33-59).

Regarding Claim 3, Murayama et al. disclose that the readout control circuit is adapted to perform color interpolation using two pixel sensor elements read out in parallel (Column 3, Lines 33-59).

Regarding Claim 7, Murayama et al. disclose that the pixel elements form a portion of a charge coupled device (See Figure 2 and Column 3, Lines 33-59 and note that the Murayama et al. device may be considered to be charge coupled in that charges from plural sensor elements are coupled together upon readout).

Regarding Claim 8, Murayama et al. disclose that the pixel sensor elements form a portion of a complementary metal oxide semiconductor device (Column 1, Lines 15-18).

Regarding Claim 14, Murayama et al. disclose that at least a portion of the pixel sensor

elements are active (switches in each pixel).

Regarding Claim 15, Murayama et al. disclose that at least a portion of the pixel sensor elements are passive (photodiodes).

Regarding Claim 16, Murayama et al. disclose that at least a first pixel sensor element is associated with a different color filter component than a neighboring pixel sensor element (Figure 2).

Regarding Claim 18, Murayama et al. disclose that the predefined pattern comprises the colors of red, blue and green (Figure 2).

Regarding Claim 21, Murayama et al. disclose that the readout control circuit and the array controller read out a first set of pixel sensor elements and then readout a second set of pixel sensor elements, such that the second set of pixel sensor elements only partly overlaps a portion of the first set of pixel sensor elements (See Figure 2 and Column 3, Lines 33-59 where the pixels of each color partially overlap each other).

Regarding Claim 22, Murayama et al. disclose that the readout control circuit and the array controller process a first set of pixel sensor elements and then process a second set of pixel

sensor elements, such that the second set of pixel sensor elements does not overlap the first set of pixel sensor elements (See Column 3, Lines 33-59 where the pixel data is processed in such a way that the resultant red, blue and green summed color signals are separate from each other and therefore do not overlap each other).

Regarding Claim 23, Murayama et al. disclose that the readout control circuit and array controller process a first set of pixel elements, skip a second set of pixel sensor elements and process a third set of pixel sensor elements (See Column 3, Lines 33-59 and note that each color is processed separately. Therefore the processing of any two of the three colors inherently skips the processing of the third).

Regarding Claim 28, Murayama et al. disclose a camera coupled to the readout control circuit (Column 1, Lines 11-13).

Regarding Claim 29, Murayama et al. disclose a method of interpolating color components of an array of pixel sensor elements, the method comprising reading a first rectangular portion of an array of pixel sensor elements simultaneously (Column 2, Lines 47-57), wherein the first rectangular portion includes pixel sensor elements from at least two array columns and two array rows (for instance, pixels 00,01,10 and 11 of Figure 2); reading a second rectangular portion of the array of pixel sensor elements (for instance, pixel elements 21, 22 and 23), wherein the second

portion partly overlaps the first portion (See Figure 2); and reconstructing color components using interpolation for at least a third portion of the array (for instance pixels 03, 13) while the third portion of the array is being read (Column 3, Lines 33-59).

Regarding Claims 31 and 32, Murayama et al. disclose that reconstructing color components using interpolation is performed in real time and in the analog domain (Column 2, Lines 33-59).

Regarding Claim 33, Murayama et al. disclose that the overlapped portion is used to interpolate color components in both the first rectangular portion and the second rectangular portion of pixel sensor elements (Column 3, Lines 33-59).

Regarding Claim 34, Murayama et al. disclose reading a fourth portion of pixel elements and then reading a fifth portion of pixel sensor elements, such that the fourth portion of pixel elements does not overlap the fifth portion of pixel sensor elements (reading from a plurality of groups of pixel elements different from the first group).

Regarding Claim 35, Murayama et al. disclose that the act of reading includes reading a first set of pixel sensor elements in an array row (for instance, reading the first elements of each group of pixels in the second row in Figure 2 for the production of green signal information in

each of the groups along the row), skipping a second set of pixel elements in the array row (the blue pixels in the second row are skipped in the production of the green signal) and reading a third set of pixel sensor elements in the array row (reading the third elements of each group of pixels in the second row for the production of the green signals), the method further comprising summing a plurality of pixel sensor value readouts associated with a corresponding plurality of pixel sensor elements associated with a first color to produce a first color component corresponding to a first skipped pixel sensor element (See Column 3, Lines 33-59 and note that the green signal is a summed signal and is skipped in the production of a red signal); and summing a plurality of pixel sensor value readouts associated with a corresponding plurality of pixel sensor elements associated with a second color to produce a second color component corresponding to a second skipped pixel sensor element (See Column 3, Lines 33-59 and note that the red signal is a summed signal and is skipped in the production of a blue signal).

Regarding Claim 36, Murayama et al. disclose summing a plurality of pixel sensor value readouts associated with a corresponding plurality of pixel sensor elements associated with a first color to produce a first color component and summing a plurality of values associated with a plurality of pixel sensor elements associated with a second color to produce a second color component (Column 3, Lines 33-59).

Regarding Claim 38, Murayama et al. disclose a color imager comprising a first light

sensor which generates a first analog output signal related to the amount of a first color of light sensed; a second light sensor which generates a second analog output signal related to the amount of a first color of light sensed; a third light sensor which generates a third analog output signal related to the amount of a second color of light sensed; a fourth light sensor which generates a fourth analog output signal related to the amount of a third color of light sensed; a circuit configured to read out the first, second, third and fourth analog values at the same time; and an interpolation circuit configured to receive a first and second output signal and provide on-the fly-interpolation based on at least the first and second output signals (Column 3, Lines 33-59).

Regarding Claim 39, Murayama et al. disclose a method of interpolating a color value in the analog domain in real-time comprising receiving a first analog signal corresponding to the output of a first pixel element (pixel 03) in an imager, the first pixel element used to sense light intensity of a first color (green); receiving a second analog signal corresponding to the output of a second pixel element (10) in the imager, the second element spaced from the first pixel element, wherein the second pixel element is used to sense light intensity of the first color (green); receiving a third analog signal corresponding to the output of a third pixel element (30) in an imager at the same time as the first and second analog signal, the third element in a different imager row and column than the second element, wherein the second pixel element is used to sense light intensity of the first color (green); generating a fourth analog signal based on the second analog signal and the third analog signal (Column 3, Lines 33-59; the summed red, green

and blue signals); generating an analog interpolation signal, the analog interpolation signal used to create a color value in real-time for a location situated between the first analog signal and the fourth analog signal (Column 3, Lines 33-59; the RGB color value for the pixel group).

Regarding Claim 40, an image in Murayama et al. is based on the first, second and interpolation signals (Column 1, Lines 11-13).

Regarding Claim 41, Murayama et al. read a fourth pixel element located in a line of pixels, skip a fifth pixel element in the line, and read a sixth pixel element located in the line of pixel elements (in reading the green pixels for the green summation of the next horizontally positioned pixel group).

4. Claim 1 is rejected under 35 USC 102(b) as being anticipated by Suzuki (U.S. Patent No. 4,709,259).

Suzuki discloses a color imaging system providing on-the-fly color interpolation using analog signals to reconstruct colors during sensor readout, comprising an array of pixel sensor elements wherein at least part of the array is arranged in rows and columns (Figure 1); a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array (Figure 1); a readout control circuit (132); an array controller (132) coupled to the array (Figure 2), wherein the readout circuit and the array

controller are configured to simultaneously read out values for a group of pixel elements within a first portion of the array, including at least two pixel elements from two different rows and two pixel elements from two different columns and to reconstruct color components for at least a first pixel sensor element and a second pixel sensor element using color information from other pixels elements within at least the first portion of the array while the readout control circuit is reading the first portion of the array (Figure 6; Column 6, Lines 61-66).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2 and 30 are rejected under 35 USC 103(a) as being unpatentable over Murayama et al. in view of Younse et al. (U.S. Patent No. 4,805,023).

Regarding Claim 2, Murayama et al. disclose all of the limitations except for the recited comparator circuit and delay element. However such is well known in the art for correcting an image for pixel defects, as disclosed in Younse et al. (Figure 2; Column 2, Lines 4-27). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate in Murayama et al. the recited comparator circuit and delay element, as taught in Younse et al., in order to improve image quality by correcting the image for pixel defects.

As to Claim 30, see discussion of Claim 2.

6. Claim 4 is rejected under 35 USC 103(a) as being unpatentable over Suzuki in view of Smith (U.S. Patent No. 5,418,565).

Regarding Claim 4, Suzuki discloses a first analog line storage unit (Figure 6; adder 180b that stores a signal from a green output line); a second analog line storage unit (Figure 6; adder 180a that stores a signal from a red output line) that stores a third line readout from the array, where the readout control circuit combines a second consecutive line readout from the array with the first line readout stored in the first analog line storage unit to produce a first RGB triplet (Figure 6).

Suzuki does not disclose that the combining includes averaging or that a fourth consecutive line readout from the array is averaged with the third line readout to produce a second RGB triplet. However, Smith discloses averaging color components, and including a fourth consecutive readout being averaged with a third readout (See Figures 6 and 8), an operation that enables the production of a low-resolution image for a camera using the well known and commonly used Bayer filter arrangement (Column 6, Lines 45-60), an arrangement that increases the utility of a camera by enabling the production of a plurality of resolution levels (Column 1, Lines 6-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Suzuki device to use a Bayer filter arrangement since such is commonly used in the art, and further to perform the recited averaging in Suzuki in order to

increase the utility of the device by enabling the production of a plurality of resolution levels.

7. Claim 5 is rejected under 35 USC 103(a) as being unpatentable over Suzuki in view of Smith and further in view of Takatori et al. (U.S. Patent No. 5,408,422).

Suzuki and Smith disclose all of the limitations except that the analog storage units are capacitors. However such is a common design for an adder, as disclosed in Takatori et al. (See Figure 6). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Suzuki using capacitors since such is common for an adder circuit.

8. Claim 6 is rejected under 35 USC 103(a) as being unpatentable over Murayama et al. in view of Wilder et al. (U.S. Patent No. 5,262,871).

Murayama et al. disclose all of the limitations except for the readout control circuit being programmable. However it is well known in the art to provide for an image sensor a programmable readout control circuit so that a user may select a desired resolution for an output single in order to permit a user-selected tradeoff between resolution and scanning speed, as disclosed in Wilder et al. (Column 2, Lines 26-47). Such a provision in Murayama et al. would clearly increase the utility of the device by enabling user selection of resolution/scanning speed. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide in Murayama et al. the recited programmable readout control circuit to provide increased utility by permitting user-selected resolution/scanning speed tradeoffs.

9. Claims 9-13 are rejected under 35 USC 103(a) as being unpatentable over Murayama et al. in view of Jie et al. (U.S. Patent No. 6,133,954).

Regarding Claim 9, Murayama et al. disclose a summing circuit for each of the colors (Column 2, Lines 10-14) and disclose modifying the output level of each color (Column 2, Lines 40-46) but do not disclose the use of programmable gain amplifiers for this purpose, shift register timing or light shielding opening sizes being used instead. However it is well known in the art to use programmable amplifiers to modify the respective color signal outputs of an image sensor, as disclosed in Jie et al. (See Figure 1). It is clear that the use in Murayama et al. of amplifiers such as those disclosed in Jie et al. would increase the functionality of the weighting operation by enabling variable control of the operation instead of the fixed values obtained from the disclosed methods, and would further increase the device's functionality by enabling the performing of variable color balance operations (See Column 7, Lines 18-20). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide in Murayama et al. a programmable amplifier for each color signal in order to increase the functionality of the device.

Regarding Claims 10-12, the programmable gain amplifiers of Murayama et al. and Jie et al. are implemented as a separate stage, are contained within a pixel circuitry of the array and are within a plurality of column buffers (See Jie et al.; Figure 1 and Column 7, Lines 1-13).

Regarding Claim 13, Murayama et al. and Jie et al. disclose that the amplifiers have different transfer functions (See Jie et al.; Figure 1) but do not disclose that an exponential value is included. However Official notice is given that it is well known in the art to include an exponential value in the transfer function of an amplifier in order to create a logarithmic response thereby increasing the amplifier's dynamic range. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include an exponential value in the transfer function of the amplifiers in Murayama et al. and Jie et al. in order to create a logarithmic response thereby increasing the device's dynamic range.

10. Claims 17, 19, 25 and 27 are rejected under 35 USC 103(a) as being unpatentable over Murayama et al.

Regarding Claim 17, the filter pattern in Murayama et al. is not a Bayer pattern. However Official notice is given that a Bayer pattern is very well known in the art as an alternative configuration to that used in Murayama et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the Bayer pattern in Murayama et al. as a well known alternative design.

Regarding Claim 19, the filter pattern in Murayama et al. is not that which uses complementary colors such as yellow, cyan and magenta. However Official notice is given that such a pattern is very well known in the art as an alternative configuration to that used in

Murayama et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a pattern consisting of yellow, cyan and magenta in Murayama et al. as a well known alternative design.

Regarding Claim 25 and 27, Murayama et al. disclose that the image pickup element produces a color picture (Column 1, Lines 11-13). Such pictures are commonly used for monitoring in a television application. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to couple the readout control circuit of Murayama et al. to a television including a monitor in order to use the device for an application well known for image sensors.

11. Claim 20 is rejected under 35 USC 103(a) as being unpatentable over Murayama et al. in view of Sano et al. (IEEE).

Murayama et al. disclose all of the limitations except that of a micro-lens layer. However such a design for an image sensor is well known in the art and increases the sensitivity of the device, as disclosed in Sano et al. (Figure 2; Abstract). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Murayama et al. device so as to have a micro-lens layer in order to increase its sensitivity.

12. Claims 24, 37 and 42 are rejected under 35 USC 103(a) as being unpatentable over

Murayama et al. in view of Roberts (U.S. Patent No.5,541,654).

Regarding Claims 24, 37 and 42 Murayama et al. disclose all of the limitations except that of the readout control circuit and the array controller only processing a sub-region of the array in a windowing operation. However such an operation for an image sensor is well known and increases the utility of the device by permitting output of selected array portions at selected frame rates, as disclosed in Roberts et al. (See Figure 6 and Column 10, Lines 9-20). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to configure the Murayama et al. device so that its readout control circuit and array controller only processes a sub-region of the array in order to increase its utility by permitting output of selected array portions at selected frame rates.

13. Claim 26 is rejected under 35 USC 103(a) as being unpatentable over Murayama et al. in view of Kondo et al. (U.S. Patent No. 5,640,202).

Murayama et al. disclose all of the limitations except that of a personal computer being coupled to the readout control circuit. However it is well known in the art to couple a personal computer to the readout control circuit of a camera in order to enable advanced image processing of the output image data, as disclosed in Kondo et al. (Column 5, Line 33; Column 2, Lines 38-44). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to couple the Murayama et al. readout control circuit to a personal computer in order to enable advanced image processing of the output image data.

14. Applicants' amendment necessitated the new ground of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any response to this final action should be mailed to:

Box AF
Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only).

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

16. Any inquiry regarding this communication or earlier communications from the examiner should be directed to Andy Christensen whose telephone number is (703) 308-9644.

If attempts to reach the examiner by telephone are unsuccessful the examiner's supervisor, Wendy Garber, can be reached on (703) 305-4929.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

ac
October 30, 2001

ANDREW B. CHRISTENSEN
PRIMARY EXAMINER